[Mole—*Talpa Europea.*]

CURIOSITIES OF BRITISH NATURAL HISTORY.

MOLES.

Though rains and driving sleets "deform the day delightless," though "winter lingers on the budding bush," yet will not the field-naturalist, he who loves to observe for himself the progress of vegetation, and the habits and instincts of living things, deem the present month destitute of interest; and as he wends his way over greening fields, by thorny brakes, and tangled woods, he will observe many objects, and note many "unconsidered trifles," to him full of interest or instruction. Among these, the results of the labours of that "goodman delver," the mole, will not be overlooked.

The mole, like the rook, has its advocates and its opponents—one party regarding it as benefiting the agriculturist by its mining operations, another party accusing it as the author of extensive mischief. The benefits and the injuries produced by this little animal may be at once appreciated when we come to investigate its habits, instincts, and general economy. We need not say that the mole is a miner, living an almost exclusively subterranean life, ever pursuing its prey through the soil, and working out long galleries in the chase. In accordance with its destined habits is the whole of its structural development. No one examining the external conformation and internal structure of the mole could err in his inferences. We may observe that the body is cylindrical and compact; the snout prolonged and pointed; the limbs very short; the anterior pair present a thick, contracted arm, terminating in broad solid paws, with five fingers scarcely divided, and armed with strong flat nails. The tournure of these *scrapers*, for such they are, gives them an obliquely outward position, and facilitates their use as scooping instruments, by which the soil is not only dug up, but thrown backwards at each stroke, and that with great energy. The hinder limbs are small, and the feet feeble in comparison with the anterior *scrapers;* while the body tapers to them from the chest and shoulders, so the hinder quarters offer no impediment to the animal's progress through its narrow galleries. The fur, moreover, is such as best befits a subterranean dweller—it is extremely close, fine, short, and smooth, and resembles the nap of black velvet. There is no external conch to the organs of hearing, the sense of which is acute in the extreme; a simple auditory opening, capable of being closed or dilated at pleasure, leads to the internal apparatus, which is effectually defended from the intrusion of particles of earth or sand. At a cursory glance the mole appears to be destitute of eyes; they are, however, not wanting, though very small, and buried in the fur. A limited power of vision is sufficient for this dweller in the dark; the mole, however, can see better than might be imagined. By a peculiar muscular contrivance it is capable of bringing forward, or of drawing in, the eye—and this, when withdrawn, is enveloped in and defended by the close fur; so that, as is the case with the ear, no particles of earth can injure it. We have said that the sense of hearing is exquisite; and to it the mole trusts for warning on the approach of danger:—

> "Pray you, tread softly, that the blind mole may not
> Hear a foot fall."—Shakspere.

But the sense of smell is equally delicate; and by this it is guided in its search for food. It bores its long sharp nose in the earth as it traverses its galleries, and immediately detects worms and the larvæ of insects, which constitute its chief food. Nor is the feeling of this part at a low ratio: it is, on the contrary, very acute and susceptible, and aids the sense of smell in the procuring of food. The pointed snout is, indeed, a

finger-like organ of prehension, as well as a boring instrument. The general skin of the body is strong and tough, and not easily torn or lacerated.

When we examine the osseous and muscular development of the mole, we find a perfect correspondence with its external characters and the perfection of its senses. The great development of the skeleton is anteriorly, namely, in the bones of the shoulders, arms, and chest. The skull is depressed above, elongated, and pointed; and the snout, continued beyond the maxillary and nasal bones, is supported by a little additional bone, produced by the ossification of the cartilage. Its boring faculties are rendered still more effective by the ossified condition of the ligament of the neck, which passes from the back of the skull, down the cervical vertebræ, and which in other animals is elastic. The power of pushing with the snout is thus increased, and the strain upon the neck more easily borne. The muscles of the neck, which act on this bone and on the head, are very voluminous. The ribs are strong, and the capacity of the chest considerable. From the breast-bone an additional portion advances forwards, having a deep keel, as we see in birds, for the attachment of the enormous pectoral muscles, the force of which is employed upon the fore-limbs, in the act of excavating the earth. The collar-bones are thick and short; the blade-bone, or scapula, is long and narrow; the humerus is angular, and as broad as it is long; the bones of the fore-arm are strong and thick, and the olecranon of the ulna is large and transverse, for the insertion of voluminous muscles. The bones of the broad solid hands are compacted firmly together, and form an unyielding mass; and an additional laternal bone of large dimensions and compressed form, convex on its outer aspect, extending from the radius to the first metacarpal bone, not only enlarges the breadth of the hand, but adds to its firmness and solidity. The anterior limbs are thrown as far forward as possible, for it is to the projecting portion of the sternum that the clavicles are affixed, and the enormous pectoral muscles are inserted into the humerus as low down as possible. Their action is to bring the arm backward, the palms of the hands being turned obliquely outwards. The muscles of the scapula are distinguished rather for length than volume; they are elevators of the humerus, and their office requires celerity more than power, in order that the process of burrowing may be conducted with the least lapse of time between each stroke. As excavating instruments the fore-limbs and scrapers of the mole cannot be exceeded. Thus, then, in outward endowments and in internal structure, as well as in the perfection of its senses, is this animal fitted for its laborious operations, which cease not but with its life. We have alluded to worms and the larvæ of insects as constituting the food of the mole, and we shall find its teeth, which are small, exhibiting a decidedly insectivorous character, the molars being crowned with sharp-pointed tubercles or eminences.

From this very general glance at the organization of the mole, let us proceed to an investigation of its habits and modes of life.

> "Well said, old mole;—canst work in the earth
> So fast?—A worthy pioneer."—SHAKSPERE.

It is to M. Henri le Court, who, when the French Revolution broke forth with all the excesses an infuriated populace can be imagined to commit, retired into the country, and there, remote from scenes of devastation and bloodshed, devoted himself to the study of this animal, that we are indebted for the most interesting facts in its history.

The discoveries which were made by this observer were published in 1803, by M. Cadel de Vaux, and in a compressed form by M. Geoffroy St. Hilaire, in his 'Cours d'Histoire Naturelle.'

It would appear that the subterranean labours of the mole are exerted in the accomplishment of very different objects. Each mole may be said to have its own district or manor, its hunting-ground, and its lodges; and this ground is traversed by high-road tunnels, through which it travels from one part to another, all branching off from a central fortress—its ordinary residence, which is, however, not only distinct, but often remote from the chamber in which the nest is made and the young reared. We will begin by describing the fortress, or ordinary domicile:—This fortress is constructed under a hillock of considerable size (not one of those which we ordinarily see, and which, thrown up every night, indicate its hunting excursions). This hillock is raised in some secure place, where a high bank, the roots of a tree, or the base of a wall, afford protection. The earth forming this mound is well compacted together, and made solid by the labours of the architect; and within this firm-set mound is a complex arrangement of galleries and passages of communication. First, a circular gallery occupies the upper portion of the mound, and this communicates by means of five descending passages with another, and with a gallery at the base of the mound, and enclosing a larger area. These passages are nearly at equal distances. Within the area of this lower gallery is a chamber, not immediately communicating with it, but with the upper gallery, by three abruptly descending tunnels, so that to get into the basal gallery the mole has first to ascend to the top gallery, and from that descend into the lower gallery. This chamber is the dormitory of the mole. From the basal gallery opens a high-road tunnel, which is carried out in a direct line to the extent of the manor over which the individual presides, and from the bottom of the central chamber a passage descends, and then sweeping upwards joins this main road at a little distance from the hillock; so that the mole can enter the high-road either from its dormitory or from the basal gallery. Besides the high-road eight or nine other tunnels are carried out from the basal gallery; they are of greater or less extent, and wind round more or less irregularly, opening into the high-road at various distances from the hillock: these irregular tunnels the mole is continually extending in quest of prey; throwing up the soil above the turf, through holes which it makes for the purpose, and which form the ordinary mole-hills which we often see crowded thickly together. The high or main road exceeds in diameter the body of the mole, and is solid and well trodden, with smooth sides; its depth varies, according to the quality of the soil, instinct directing the little excavator in his work. Ordinarily it is five or six inches below the surface, but when carried under a streamlet or pathway it is often a foot and a half beneath. It sometimes happens that the mole will drive two or more additional high-roads in order to the extension of its operations; and one high-road occasionally serves several moles, which, however, never trespass on each other's preserves. They often meet in these roads, which will not admit of two passing at the same time; one therefore must retreat, but when two males thus come into collision they frequently attack each other, the weaker falling a victim in the combat. The alleys opening from the sides of the high-road are generally inclined downwards with a gradual slope, and then at the termination of these the mole excavates branch alleys, upheaving mole-hills as it works onwards in pursuit of prey. This, however, is not invariably the case, but rather where prey is abundant in rich soils: where the soil is barren the mole is constantly driving fresh alleys; these in winter are carried deep down to where the

worms have pierced their way beyond the line to which the frost penetrates; for, be it observed, the mole does not hybernate, but is as active during winter as in spring or summer, though the results of his operations are less manifest. In soft rich soils, where the worms are among the roots of the turf, the mole, as may be often noticed, drives very superficial runs in the pursuit of them; these runs are to be seen where a thin layer of richly manured soil overlays a stratum of gravel: in fact the depth of these alleys is always determined by the quality of the soil and consequent situation of the worms. With respect to the nest of the female, it is generally constructed at a distance from the fortress, where, at some convenient part, three or four passages intersect each other: this point of convergence is enlarged and rendered commodious, and fitted to receive a bed made of dry herbage, fibrous roots, &c. The chamber is generally beneath a large hillock, but not always; and the surrounding soil is usually such as to afford abundant food to the female with little trouble on her part. The mole breeds in the spring, mostly in April, and brings forth four or five young at a birth. These are supposed to remain under the mother's care till about half grown, when they commence an independent existence.

Of all animals the mole is one that endures fasting the least; a short fast proves fatal to it, hence it is necessarily ever labouring in quest of food. It would appear that all its animal appetites are in excess; its hunger is voracity amounting to rage, under the influence of which it fastens on its prey with intense eagerness. Earthworms are its favourite food, and these it skins with great address, squeezing out the earthy contents of the body before swallowing it. It is not, however, exclusively upon earthworms and the larvæ of insects that the mole feeds; during the months of June and July it is in the habit of leaving its runs under the turf, and of wandering during the night (and occasionally even during the day) on the surface, in quest of prey, such as birds, mice, frogs, lizards, snails, &c.; but it refuses to touch the toad, in consequence no doubt of the acrid exudation from that reptile's skin. During these noctural excursions it often falls a prey to the owl; and we have seen it in the day time caught and killed by dogs. It might be supposed from the figure of the mole that its motions were very slow and deliberate; it trips along, however, at a fair pace, and traverses its underground runs and galleries with great rapidity. Of this the experiments made by Le Court afford decisive proof. Watching the opportunity while a mole was feeding, at the extreme limits of its territory, he placed along the course of the high road to its fortress a number of little flagstaffs, each staff being a straw, and the flag a bit of paper; the ends of the straws were pushed down into the tunnel. When all was ready he blew a horn inserted into one of the openings of the feeding alleys, frightening with the horrid blast the animal then busily engaged in the important task of satisfying its hunger. Off started the mole for its fortress, and down went flag after flag in rapid succession, as the frightened creature impelled by terror rushed along the tunnel to its asylum. So swift was its pace, that the spectators compared it to that of a horse at a moderate trot.

The voracity of the mole and its perpetually recurring repasts upon animal food, render water not only a welcome refreshment, but necessary to its existence. A run, sometimes used by many individuals, always leads to a ditch, stream, or pond, if such be within a moderate distance. If these natural supplies be not at hand, the mole sinks little wells, in the shape of perpendicular shafts, which become filled with the rain, and retain the water; and they have sometimes been found brimfull. Scarcity of water, or a drought, as well as a scarcity of worms, often obliges the mole to shift its quarters, and locate upon other grounds. In its migration it will cross brooks or rivers, swimming admirably; and when spring or autumn floods inundate the fields, it easily saves itself by these means. It is moreover affirmed that in this peril the male and female brave the waters together, and expose themselves to the utmost danger in order to save their young, in which office of parental devotion they mutually assist and protect each other.

It is a remarkable circumstance that the males of this animal are far more numerous than the females, and in the early part of the spring the former often engage in most desperate conflicts, the victor not unfrequently leaving the vanquished dead upon the spot. The attachment of the male to his mate is very powerful;—and instances are not uncommon of the male lying dead beside the female, the latter having been killed in a trap. It must be recollected that a short fast proves fatal to these animals—and it is not improbable that, impelled by the force of instinctive attachment, which overcame that of hunger, the male rejected or forbore to seek food, and thus pined to death.

With the voracity of the mole is joined a fierce and combative disposition. If several moles be kept in a box of earth, and not supplied with an abundance of food, they attack each other, and the weaker falls a prey to the stronger: when the mole seizes, it holds like a bull-dog, with a tenacious gripe; and is not easily disengaged. Mr. Jackson, as stated by Mr. Bell, says that, "when a boy, his hand was so severely and firmly laid hold of by one, that he was obliged to use his teeth in order to loosen its hold." M. Geoffroy St. Hilaire describes the manner in which the mole approaches and seizes a bird: it exerts several stratagems to get within reach of its victim, employing the utmost address and caution; but when this is accomplished, it suddenly changes its plan, and makes an instantaneous and impetuous attack, fastens on the hapless bird, tears open the abdomen, thrusts its snout among the viscera, and revels in its sanguinary repast. After satiating its ravenous appetite, the mole sinks into a profound repose: in the winter it slumbers in its fortress; but in the summer, beneath some ordinary mole-hill in one of its alleys. This sleep endures for about four hours, or perhaps longer in the middle of the day, when it awakes with a renovated appetite. Its busiest time is in the evening, during the night, and early in the morning. We have, however, ourselves seen it busy above-ground in the earlier part of the day; on one occasion we saw several in a damp meadow near the canal running from Calais to St. Omer, and a dog belonging to one of the passengers on board the boat killed two or three.

From what we have said of the habits of the mole, some idea may be formed as to whether it injures or benefits the agriculturist and horticulturist.—It is certainly not herbivorous; for though fibrous roots and other vegetables have been occasionally found in its stomach, it is evident that they were only accidentally swallowed with the worms it had dislodged from among the roots of the grass, or with the larvæ which it had extricated by gnawing the vegetable matters into which they had bored. As regards its nest, which is made of dried grasses, fibrous roots, moss, and the like, little injury can result from the animal constructing it of these materials. It is true that Geoffroy St. Hilaire and Le Court counted two hundred and four young wheatblades in one nest, but this is evidently not an ordinary occurrence. It is alleged that the fortresses which the mole constructs for its autumn and winter residence, when left in the summer (the mole usually forming a new one for its next winter retreat), afford protection to the field-mouse, of which the ravages are

often so severe; but the field-mouse would make a burrow for itself, did it not find one constructed for its purpose, and would neither leave the spot nor become diminished in numbers if not a mole-hill were in the country; besides, the field-mouse frequently fall a prey to the mole. This objection, therefore, against the mole is destitute of solidity, though it has often been urged. The injury, therefore, which the mole produces must be, first, from thinning the soil of earthworms; and secondly, from making galleries, and thus interfering with the roots of vegetables, thereby causing their destruction. The first argument has perhaps some weight. The utility of the earthworm is unquestionable. It loosens the soil by its boring operations; thereby rendering it more porous and susceptible of the infiltration of water, so essential to the nutriment of plants. It moreover raises as well as lightens the surface of the soil, insomuch that stones and other objects which cumber the ground are even in a few months buried beneath an accumulation of mould, the rejectamentum of the nutritive materials of myriads of these creatures, the effect of whose agency is to level and smooth the surface of the soil and fit it for herbage. Thus may they be called pasture-makers, or top-dressers of pasture land. Still, granting all this, it is questionable whether in rich soils the quantity of worms destroyed, however great, would materially reduce their countless numbers. With respect to the second point, moles certainly do mischief in some cases to the farmer, by excavating their runs and galleries, and that especially in fields of grain, after the seed is sown, and when the blades are rising: they do more mischief, however, in gardens; but there they occur very rarely. There are, however, cases in which the mining operations of the mole appear to be decidedly beneficial. In extensive sheep-walks, the subsoil which they throw up forms a good top-dressing to the short grass, the roots of which they do not appear to injure, and it has been asserted that sheep-walks from which these animals have been extirpated have become materially altered in the character of their '*feed*,' and that the proprietors of the sheep have been obliged to introduce them again. It may be concluded, then, that the evils which the mole occasions by its works have been greatly magnified: while, perhaps, on the other hand, too much benefit has been attributed, by its advocates, to the results of its habits and economy.

The mole does not exist in the extreme north of Scotland, in Zetland, or the Orkney Islands, nor has it been seen in any part of Ireland.

Varieties of this animal often occur: we have examined specimens of a mouse-colour, of a white, cream white, and pale yellowish orange.

The names by which the mole is known in England are Mouldwarp, Mouldiwarp, and, in Dorsetshire and Devonshire, *Want*. "Wand" is its old Danish name; and "Vond" its present name in Norway. The Welsh term it Gwadd, and Twrch daear. It is the Maulwerf of the Germans; La Taupe of the French; Topo of the Spanish; Toupeiro of the Portuguese; and Talpa of the Italians.

'Fort Cuppewa, on the river Welland, or Chippewa.—From a Drawing by Mrs. Simcoe, taken during the American Revolutionary War.'

THE NIAGARA DISTRICT, WESTERN CANADA.—No. II.

THE district situated between Lake Ontario and Lake Erie, as it has been the longest settled, so also is it the best cultivated part of Western Canada. The vicinity to the two great lakes renders the climate more agreeable, by diminishing the severity of the winter and tempering the summer heats. Fruits of various kinds arrive at great perfection, cargoes of which are exported to Montreal, Quebec, and other places situated in the less genial parts of the Eastern province. Mrs. Jameson speaks of this district as "superlatively beautiful." The only place approaching a town in size and the number of inhabitants, from the Falls all along the shores of Lake Erie for a great distance, beyond even Grand River, is Chippewa, situated on the river Welland, or Chippewa, which empties itself in the Niagara Strait, just where the rapids commence and the navigation terminates. One or more steam-boats run between Chippewa and Buffaloe. Chippewa is still but a small village, but as it lies immediately on the great route

from the Western states of the American Union to the Falls of Niagara and the Eastern states, it will probably rise into importance.

In no country on the face of the globe has nature traced out lines of internal navigation on so grand a scale as in North America. Entering the mouth of the St. Lawrence, in the north-eastern part of the continent, we are carried by that river through the great lakes to the head of Lake Superior, a distance of nearly nineteen hundred miles. On the south we find the Mississipi pouring its waters into the Gulf of Mexico, within a few degrees of the tropics, after a course of three thousand two hundred miles. The 'Great Water,' as the name signifies, and its numerous branches, drain a surface of about one million one hundred thousand square miles, or an area about twenty times greater than England and Wales. The tributaries of the Mississipi equal the largest rivers of Europe. The course of the Missouri is probably not less than three thousand miles. The Ohio winds above a thousand miles through fertile countries. The tributaries of *these* tributaries are great rivers. The Wabash, a feeder of the Ohio, has a course of about five hundred miles, four hundred of which are navigable. When the canal is completed which will unite Lake Michigan with the head of navigation on the Illinois river, it will be possible to proceed by lines of inland navigation from Quebec to New Orleans. There is space within the regions enjoying these advantages of water-communication, and already peopled by the Anglo-Saxon race, for five hundred millions of the human race, or more than double the population of Europe at the present time. Imagination cannot conceive the new influences which will be exercised on the affairs of the world when the great valley of the Mississipi, and the continent from Lake Superior to New Orleans, is thronged with population. In the valley of the Mississipi alone there is abundant room for a population of a hundred millions.

The line of navigation by the St. Lawrence did not extend beyond Lake Ontario until the Welland canal was constructed. This important work is forty-two miles long, and admits ships of one hundred and twenty-five tons, which is about the average tonnage of the trading vessels on the Lakes. The Niagara Strait is nearly parallel to the Welland canal, and more than one-third of it is not navigable. The canal, by opening the communication between Lake Ontario and Lake Erie, has conferred an immense benefit on all the districts west of Ontario. The great Erie canal, described in No. 466, has been still more beneficial, by connecting the lakes with New York and the Atlantic by the Hudson river, which the canal joins after a course of three hundred and sixty-three miles. The effect of these two canals was quickly perceptible in the greater activity of commerce on Lake Erie, and the Erie canal has rendered this lake the great line of transit from New York to the Western states.

The first steam-boat which navigated the lakes was built at Erie in 1818. In that year the tonnage of all the lakes did not exceed two thousand tons; but, according to Mr. Buckingham's very recent statement, it now exceeds fifty thousand tons, and employs six thousand men. The largest of the steam-vessels are from seven to eight hundred tons, and the smallest three hundred tons. Some of the finest steam-boats in the United States are to be found here. They navigate from Chicago on Lake Michigan, to Buffaloe in the state of New York, a distance of nearly a thousand miles; and a great part of the voyage on these inland seas is made out of sight of land. The steam-boats are built as strongly as if intended for navigating the ocean. Mr. Buckingham, who was much struck with their capabilities, and the excellence of all their internal arrangements, gives the following account of two which particularly attracted his attention:—"The Illinois," he says, "is built after the fashion of the Eastern boats, such as go between New York and Providence or Boston, but much more elegant than any of these. The Illinois indeed may be called a floating palace, the most costly decorations being everywhere lavished on her, as may be judged of from the fact of her costing 130,000 dollars (27,000*l.*) from the builder's hands. The Great Western is another splendid boat, still larger than the Illinois, and almost as richly ornamented, but built on the plan of the Mississipi boats, with a double deck of cabins, so as to accommodate about five hundred passengers, with high-pressure engines, but combining also speed, safety, and comfort in an unusual degree." In the passage down Lake Erie, ships, brigs, sloops, and schooners are seen in every direction on the horizon. Mr. Buckingham counted above one hundred, and twenty-two were in sight at one time. The voyage from Cleaveland, or the southern shore of Lake Erie, to Buffaloe, a distance of one hundred and ninety miles, occupied about sixteen hours. How great the contrast to the time when only the Indian canoe was seen upon these waters!

SOUTH STAFFORDSHIRE AT NIGHT.

Many of our counties excel Staffordshire in those traits which, either for their beauty or their singularity, attract the attention of the traveller when viewed by day; but perhaps none is more remarkable, more startling than this, when seen by night, especially the southern portion of the county. The whole face of the country seems to be on fire. A lurid glare speckles the scene around in a manner very inexplicable to one unacquainted with the mineral character of the district. From Birmingham to Wolverhampton, from Stourbridge to Walsall, in whatever way we travel, by night, over the extreme southern portion of the county, appearances are presented which, if seen near London, would set all the Fire Brigade into activity.

We are to look to the mines of coal and iron as the source of these peculiarities. South Staffordshire is one of our richest and most valuable mineral districts. It possesses the ironstone which affords, by smelting, the metallic iron for our various uses, and it supplies the coal for the smelting. In the geological maps of the county, the coal and iron district is marked out by some such limits as the following:—From Stourbridge and Halesowen in the south (near the latter of which Shenstone's residence of the Leasowes was situated) to Rugeley in the north, an elongated oval marks the region, the eastern boundary passing by Walsall, West Bromwich, and Smethwick; and the western by Cannock, Wolverhampton, and Sedgeley. The district is perhaps twenty miles long, in a straight line, from north to south, and four or five in average width; the southern half of this elongated oval has been the most extensively worked, Dudley, Tipton, Bilston, and Wednesbury being the centre of the busiest portion.

Most of our old topographers and historians have more or less alluded to this region of coal and iron. Camden, who is supposed to have travelled through South Staffordshire about the year 1575, says of it:—"The south part of Staffordshire hath coles digged out of the earth, and mines of iron. But whether more for their commoditie or hinderance, I leave to the inhabitants who doe or shall better understand it." What Camden means by this is not very clear; except that he took rather a slighting and unfavourable view of that which has given wealth and influence to South Staffordshire.

The records of the iron-works of Staffordshire go

farther back than those relating to coal. All our iron is now smelted with coal, or with coke produced therefrom: but formerly wood-charcoal was believed to be the only fuel fitted for this purpose; and this circumstance produced a remarkable effect on the surrounding districts. Domesday-Book and other authorities state that large portions of South Staffordshire, and the neighbouring part of Warwickshire, were covered with wood; whereas at the present day the amount of wood is extremely small, the deficiency having been occasioned by the large use of wood-charcoal in smelting the iron. A curious surmise has been offered as to the changes which the iron-smelting has produced in the districts near which it is carried on. It is supposed that in early times the north-western parts of Warwickshire, nearest to Staffordshire, were once covered with wood, and were known by the name of Arden, from a British or Celtic word implying *Woodlands*. There are still towns, such as Hampton in Arden and Henley in Arden, which seem to support this supposition. The iron of Staffordshire required, for its smelting, the wood of Warwickshire; and thus the two met, as at a centre, at Birmingham, Dudley, Wednesbury, Tipton, and Walsall. Birmingham is not itself situated in the iron district; but occupying the margin of the two regions just indicated, we arrive at something like a means of accounting for the location of manufactures in metal in these quarters.

In former times the iron-ore was not smelted on the spot where it was procured, from the gradual exhaustion of the wood required for the charcoal employed in the smelting. It was carried, partly on horses' backs and partly by other means, to places more favourable for the smelting. But now all this is at an end. The material accompanying the iron-ore is found to be adequate to the smelting; and a circle of five or six miles radius, drawn around the town of Tipton as a centre, would be found to include an extraordinary number of establishments wherein the iron-ore is dug from the mine, the coal also procured, the coal converted into coke, and the iron-ore smelted by the aid of the coke thus produced. In order to understand the effect of these arrangements on the surrounding district, it may be well briefly to explain the extent and position of the mineral treasures. We have in former volumes so fully explained the operations connected with the smelting of iron, that a very few details will suffice to illustrate our present object.

Over an area of about ninety square miles, in that part of Staffordshire immediately north-west of Birmingham, extends the Staffordshire 'Coal-field;' the strata of coal and of iron-stone occurring pretty nearly in every part, interspersed here and there by beds of different earths, such as clay, rock, sand, &c. The most remarkable strata of coal have distinctive names, by which they are known to the miners and workmen: thus the 'ten-yard coal' alludes to a seam or stratum about thirty feet in thickness. This is deemed a very rich and valuable bed of coal, and extends over the southern half of the district: it becomes thinner by degrees, and 'crops out,' or comes to the surface, near Bilston. Northward of this point, as far as Rugeley, a thinner stratum of coal is found. The general 'dip' or inclination of the strata is south and north; but many irregularities and disturbances of direction occur. Near Rugeley a 'four-yard bed' is worked at a depth of a hundred yards below the surface; southward of Wednesbury the pits are stated to be on an average an equal depth to the former; near West Bromwich and Oldbury, a hundred and thirty yards; at and near Wednesbury, forty or fifty yards; while at one spot near Wolverhampton the coal comes so near the surface, as to be procured in an open cutting, without any subterranean operations. Such are the diversities in the position of the coal, and such the mode in which the miners must follow it. Whatever quirks and turns the bed of coal takes, thither do the miners follow it with their pickaxe; slanting upwards, slanting downwards, or branching out laterally, as the case may be. A shaft is sunk from the surface of the ground to the level of the coal-bed, generally at such a spot that the coals, as cut away from the bed, may have a downward path towards the shaft. If it be the 'ten-yard coal,' the operations of the miners are tolerably straight forward, gunpowder and the pickaxe enabling him to detach mass after mass of the mineral treasure; but if the bed or seam of coal be thin, it is extraordinary to conceive how the miner can insinuate his body, in a working attitude too, in such small apertures. The recent Report of the Parliamentary Committees on Mines and Collieries gives us some striking information on this point.

Passing from the coal to the iron, we find that this comes from an ore denominated 'clay-iron-stone,' a mixture of iron, clay, and other substances, in which the iron is a more or less abundant ingredient, according to the richness of the specimen. It accompanies the coal, in greater or less quantities, throughout the whole district; being found in some strata in continuous beds, and in others taking the form of balls or lumps distributed among the clayey and other deposits. It is situated, geologically, both above and below the 'ten-yard coal;' and when found in beds or seams, it is known by the miners under the names of 'blue flats,' 'blue clist,' and 'white stone.' When it occurs in balls or lumps, these are found imbedded in clayey earth of considerable hardness, designated, according to its varieties in quality, by the odd names of 'church,' 'binds,' 'iron-stone-bearer,' 'penny-earth,' 'gubbin-stone,' 'poor robin,' &c. The iron-ore is usually closely accompanied by coal in the mine; and it is generally extracted after the coal has been removed. It is detached in small masses by the pickaxe, much in the same manner as coal; but the extraction is often more difficult, owing to the thinness of the seam. A miner will often carry on his operations in a seam only two feet in height, into which he will insinuate his body and his working tools.

These are the two minerals, the preparation of which on reaching the surface of the ground gives rise to the remarkable appearance which this part of Staffordshire presents at night. The coke-ovens, or rather coke-hills, and the iron-furnaces, are the scenes of the fire and flame and smoke which meet the traveller's eye while passing over—say from Birmingham towards Shropshire, or from Kidderminster through Dudley towards Lichfield. These coke-hills are structures of which we know nothing near London. Our manufacturers make coke in close chambers, such as ovens or retorts; but in Staffordshire, whether it be to save expense, or whether the Staffordshire coal requires a method of coking different from that which is observed in respect of the coal used near London, the coal is coked out in the open air. Near the furnace, in a spot of ground kept vacant for the purpose, the coal is heaped up in a form somewhat resembling that of a bee-hive, of large dimensions, and then set on fire; the top is covered with a layer of clay or other earthy substance, which will prevent the coal from bursting out too briskly into flame, and will cause it to smoulder till it assumes the form of coke. When a number of these hills are watched from a distance, we see smoke emanating from them in abundance, and, here and there a flickering flame, when anything occurs to disturb the clay coating on the surface.

These coke-hills constitute one source of the glare which the district presents, a never-ending series of coking operations being carried on. Another source

is that of the iron-furnaces, from whose summits a lofty pillar of flame repeatedly ascends. These furnaces are bulky brick structures, capable of containing a vast quantity of material procured from the mines. The iron-ore and the coke, together with some third substance, such as limestone, to act as a flux, are all put into these furnaces, where they are kindled. Day and night, Sunday and week-day, in rain and in sunshine, does this continue; the ingredients being thrown in at the top of the furnace, the iron being separated from the earths by the effect of heat, and the melted metal flowing out at stated intervals from openings in the bottom of the furnace. In London, where all except a small number of factories cease smoking at night, we have hardly a conception of the startling effect which these ever-burning furnaces present, especially at those hours when darkness would otherwise prevail around. Perhaps the coach-road from Birmingham to Wolverhampton is that which affords to a night traveller the most remarkable and numerous examples of this kind, having the districts around Oldbury, Dudley, Tipton, and Sedgeley, in the south, and those around Wednesbury, Walsall, and Bilston, on the north.

There is yet another source of the flickering flames so often alluded to. In some of the iron-works where casting or founding is executed, the metal is melted in lofty furnaces, open, or partially open, at the top; or rather the flame from the fire beneath often ascends to the top of the chimney, and thus presents a vivid object visible from a great distance.

The appearance of the district by day is very accurately described by Mr. Hawkes Smith, in his 'Birmingham and its Vicinity.' After speaking of the clouds of smoke, the bulky furnaces, and the tall chimneys which meet the visitor's gaze, he proceeds:—"Here and there he sees protruded the mighty arm of the giant of art, the potent steam-engine, whirling the heavy fly which regulates the motion of the whole attached machinery; while the sky is crossed by the light tracery of wheels and ropes adapted to the purposes of the mines, both right and left of the moving-power. The prospect, where the view is not impeded by the flat-topped mountainous ridges of cinder, is varied by numerous clustering hamlets, or assemblages of small houses, the habitations of the countless labourers and others called into activity by the neighbouring 'Works;' interspersed here and there with modern mansions of superior pretension oddly placed; or with dwellings of a still less congruous character, curious specimens of fretted brick-work, embroidered chimney-stacks, and chevroned gables; or black and white timbered grange-houses, the relics of an agricultural age, invaded by the encroachments of smoke and bustle,—all intermixed with a moderate supply of green or greenish fields, dotted occasionally with sooty sheep or cattle. Canals, with all their appurtenances, intersect the region in every direction, and strange noises from every quarter are wafted to the ear."

Those who have visited inns and private houses within ten or twenty miles of the district now under notice, may have remarked the huge cheerful blazing fires of Staffordshire—coal everywhere to be found. Fuel is procurable at a price which may well excite the envy of a Londoner; and we see the effects of this cheapness in the kind of fires kept up in the dwellings.

It may be well to remark that in using the term "South Staffordshire," we employ one which expresses the name of the district more correctly than any other. But, in truth, it is not easy to say what county we are in while traversing it; for Warwickshire, Staffordshire, Worcestershire, and Shropshire intertwine so greatly at this part, and there are so many outlying patches, wholly detached from the counties to which they nominally belong, that we may change our county three or four times in the course of a few miles' walk. Birmingham is in Warwickshire; Oldbury and Halesowen in Shropshire; Dudley and Stourbridge are in Worcestershire; and Wolverhampton, Walsall, Wednesbury, and Tipton in Staffordshire. And yet all these towns are within a circle of six miles radius. Even in the short distance from Birmingham to Dudley (seven miles in a straight line) we quit Warwickshire, pass into Staffordshire, thence to Oldbury in Shropshire, then a second time into Staffordshire, and end at Dudley in Worcestershire.

PUBLIC REFRESHMENTS.

Dining.—*From* 'London.'

The fortunes of Roderick Random and his companion Strap show that, in Smollett's time, there were *cellars* in London attended as eating-houses, down which many a man was wont to "dive for a dinner." When Roderick and Strap arrived in London, and had taken a cheap and obscure lodging near St. Martin's Lane, they asked their landlord where they could procure a dinner. He told them that there were eating-houses for well-dressed people, and cellars for those whose purses were somewhat of the lightest. Roderick said that the latter would better suit the circumstances of himself and his companion; whereupon the landlord undertook to pilot them to one of these cellars:—"He accordingly carried us to a certain lane, where stopping, he bid us observe him, and do as he did; and, walking a few paces, dived into a cellar, and disappeared in an instant. I followed his example, and descended very successfully, where I found myself in the middle of a cook's-shop, almost suffocated with the steams of boiled beef, and surrounded by a company consisting chiefly of hackney-coachmen, chairmen, draymen, and a few footmen out of place or on board-wages, who sat eating shin-of-beef, tripe, cow-heel, or sausages, at separate boards, covered with cloths which turned my stomach. While I stood in amaze, undetermined whether to sit down or walk upwards again, Strap, in his descent, missing one of the steps, tumbled headlong into this infernal ordinary, and overturned the cook as she was carrying a porringer of soup to one of the guests. In her fall she dashed the whole mess against the legs of a drummer belonging to the foot-guards, who happened to be in her way." How the drummer swore, and the cook rubbed his leg with salt, and Roderick recommended the substitution of oil, and how Strap made his peace by paying for the soup and treating the drummer, need not be told. The cook's-shop in the cellar is sufficiently depicted.

It is probable that itinerant piemen, such as Hogarth gives to the life, have for centuries formed one class of London characters, and that various other eatables, and drinkables too, have been vended about in a similar manner, time out of mind; but by what steps the modern cook's-shop, or eating-house, has reached its present condition, it is not perhaps easy to say. There are, it appears, about two hundred places in London which can fittingly come under the denomination of eating-houses, occupying a place between the hotels on the one hand and the coffee-rooms on the other. At all of these places joints of meat are dressed every day, depending for variety on the extent of business done, but generally including boiled beef and roast beef, as well as the necessary appendages for the formation of a dinner. In some of these houses the quantity of meat dressed in a week is quite enormous; and it seems pretty evident that the greater the sale the better the quality of the articles sold—or perhaps we may take it in an inverse order, that the excellence of the provisions has led to the extent of the custom.

Some of these dining-rooms are the scenes of bustle during only a few hours of the day; while others, either from the extent of their trade or the different classes of their visitors, present a never-ceasing picture of eating and drinking. Some, such as a celebrated house in Bishopsgate-street, are frequented almost entirely by commercial men and City clerks, who, during a few hours in the day, flock in by hundreds. Then again others, such as Williams's boiled-beef shop in the Old Bailey, and a few in the neighbourhood of Lincoln's Inn Fields, are frequented almost entirely by lawyers' clerks, witnesses, and others engaged in the law or criminal courts. In all such places there is a "best" room for those whose purses are tolerably supplied; and a more humble room, generally nearer to the street, for such as can afford only a "sixpenny plate." Again, on going farther westward, we find in the neighbourhood of Covent Garden and the Haymarket dining-rooms in great plenty, the visitants at which are altogether of a different class. Here we may see actors, artists, paragraph-makers, and foreigners, most of whom seem in much less haste than the City diners. In this quarter of the town there are many French restaurateurs, whose rooms present the agreeable variety of ladies dining without any restraint from the observation of the male visitors.

It is observable that in some houses the waiter gives the diner a long detail of the good things which are "just ready," while in others there is a printed bill of fare placed before him. The latter is certainly the most systematic method; for, by the time the nimble waiter has got through his speech, we almost forget the first items to which he directed attention. In the "bill of fare" all the dishes customarily prepared at the house are printed in certain groups, and the prices are *written* opposite those which are to be had hot on any particular day, so that a customer can at once see what provisions are ready, and how much he shall have to pay for them. In the opposite case, where the visitor knows nothing of the matter but what the waiter tells him, the routine of proceedings may be thus sketched:—The guest, perhaps a man of business who has but little time to spare for his dinner, enters the room, takes the first seat he can find (the one nearest the fire in cold weather), takes off his hat, and asks for the 'Times' or the 'Chronicle.' While he is glancing his eye rapidly over the daily news, the active tidy waiter, with a clean napkin on his left arm, comes to his side, and pours into his ear, in a rapid but monotonous tone, some such narrative as the following:—"Roast beef, boiled beef, roast haunch of mutton, boiled pork, roast veal and ham, salmon and shrimp-sauce, pigeon-pie, rump-steak pudding." The visitor is perhaps deep in the perusal of "Spanish Scrip" or "Colombian Bonds," or some other newspaper intelligence, and the waiter is obliged to repeat his catalogue; but, generally speaking, the order is quickly given and quickly attended to. A plate of roast beef, which may be taken as a standard of comparison, is charged for at these places at prices varying from 4*d.* to 10*d.*, generally from 6*d.* to 8*d.*; and other articles are in a corresponding ratio. When the meat and vegetables have disappeared, the nimble waiter is at your elbow, to ask whether pastry or cheese is wanted; and when the visitor is about to depart, the waiter adds up, with characteristic rapidity, the various items constituting the bill. "Meat 8*d.*, potatoes 1*d.*, bread 1*d.*, cheese 1*d.*," &c., are soon summed up; the money is paid, and the diner departs.

At the alamode-beef houses the routine is still more rapid. Here a visitor takes his seat, and the waiter places before him a knife, a fork, and a spoon; and gives him the choice among sundry lumps of bread kept in an open basket. Meanwhile the visitor asks for a "sixpenny plate;" and it may happen that two other customers ask at the same time, the one for a sixpenny and the other for a fourpenny plate. Out goes the waiter, calling, in a quick tone, for "two sixes and a four;" a brevity which is perfectly well understood by those who are to lade out the soup from the cauldron wherein it is prepared. Presently he returns with a pile of pewter-plates, containing the "two sixes and a four," and places them before the diners.

There is a lower class of soup-houses, where persons to whom sixpence is even too much for a dinner may obtain wherewithal to dine. Whoever has had to walk through Broad-street, St. Giles's, or down the northern side of Holborn-hill, may have seen shops, in the windows of which a goodly array of blue and white basins is displayed, and from which emanate abundant clouds of odour-giving steam. Around the windows, too, a crowd of hungry mortals assemble on a cold day, and partake (in imagination) of the enticing things within. A poor fellow, all in tatters, with a countenance which speaks strongly of privation, gazes eagerly through the window at what is going on within, and thinks how rich a man must be who can afford to pay twopence or threepence for "a basin of prime soup, potatoes, and a slice of bread;"—for it is at some such charge as this that the viands are sold.

The "chop-houses" in the City form a class by themselves. They are neither eating-houses nor taverns, nor do they belong to classes hereafter to be noticed. The solid food here to be procured is chiefly in the form of a steak or a chop, with such small appendages as are necessary to form a meal. There is no hot joint from which a guest may have a "sixpenny" or a "ninepenny" plate; nor are there the various dishes which fill up the bill of fare at a dining-room. Every guest knows perfectly well what he can procure there. If a chop or a steak will suffice, he can obtain it; if not, he goes to some house where greater variety is provided. With his chop he can have such liquor as his taste may prefer. There are some of these houses which have been attended by one generation after another of guests, comprising merchants, bankers, and commercial men of every grade. The portrait of the founder, or a favourite waiter, may perhaps be seen over the fireplace in the best room; and the well-rubbed tables, chairs, and benches tell of industry oft repeated. Sometimes the older houses exhibit a waiter who has gone through his daily routine for half a century. There is a dingy house in a court in Fleet-street where the chops and steaks are unrivalled. Who that has tasted there that impossible thing of private cookery—a *hot* mutton-chop, a second brought when the first is despatched—has not pleasant recollections of the never-ending call to the cook of "Two muttons to follow?"

Many houses have what is termed in France a *table-d'-hôte*, or in England an *ordinary;* that is, a dinner ready for all comers at a fixed hour in the day, and at a fixed charge. The host determines on the choice of good things to constitute the bill of fare; and the diner partakes of such as may best accord with his palate. Some of these places are attended day after day by nearly the same persons, while others see a constant succession of new faces. There is one such house near or in Billingsgate, celebrated for the excellence of the *fish*, which forms a component part of the cheer; and which is, on this account, much frequented by the connoisseurs in fish. A public-house (really one) in a street near Covent Garden has an ordinary of three courses, which the lovers of economical good eating, who cannot dine without fish and pastry, delight to haunt. But there are few of these. The *ordinaries* of the days of Elizabeth have left few successors.